

ABSTRACT OF THE DISCLOSURE

A fluid pump with a rotary impeller is disclosed which comprises an electromagnetically-driven, bearing-free, seal-free rotary impeller levitated by localized opposed, magnetic forces and by fluid forces, or by localized opposed magnetic forces only. Levitation by localized opposed magnetic forces alone or by a combination of magnetic and fluid forces of an impeller driven by electromagnetic forces eliminates the need for bearings and seals in the driving mechanism. This avoids the heat build-up and leakage associated with other pumping mechanisms, which can be of importance in pumping of physiological fluids such as blood. The levitating forces of the present invention are applied both axially and radially with respect to the impeller. The magnetic forces are provided by a combination of diamagnets or solenoids, opposed by permanent magnets, solenoids or electromagnets. The invention should be of use in numerous medical and non-medical applications where the benefits of impeller levitation by localized forces are apparent.